

Review of “Tracking precipitation features and associated large-scale environments over southeastern Texas” by Y. Liu et al.

*General Comments:*

This paper examines the characteristics of convection systems, i.e., mesoscale convective systems (MCSs) and isolated deep convection (IDC), and their associated large-scale meteorological patterns (LSMPs) over southeastern Texas in different seasons from 2004 to 2017. The tracks of MCSs and IDC in the region and the diurnal cycle of IDC in the Houston metropolitan area are also explored. While the study holds great potential for enhancing the understanding of the spatiotemporal features of convective systems in southeastern Texas, the paper would be more convincing with improved clarity in methodology and analysis.

*Specific comments:*

1. I think the motivation of the study is not quite clear (lines 42-47). In addition to extending previous studies in summer to other seasons, it would be more interesting to highlight what's new in this study and what specific research questions this paper tries to address. It would also be helpful to briefly review previous findings about MCSs and IDC in this region.

2. The 4-km convection dataset is the key dataset used in this study (section 2.1). It would be helpful and informative to briefly explain how MCSs, IDC, and non-convective systems are identified in the dataset and discuss any uncertainties related to the methodology. Adding information about how to separate tropical cyclone-induced precipitation from total precipitation in the dataset (lines 70-73) would be helpful, too.

3. Similarly, it is preferred to add some discussion about the potential uncertainties associated with the KHGX reflectivity and the method to identify convective cells, if any.

4. The usage of 'the initial hour' (line 120) is not very well explained. Is it exactly one hour (or a few hours) ahead of the initialization of convective systems or just the first hour of the convection? If it is just an hour before or at the time of convection, is this time frame too short or sufficient to capture the large-scale features? Have you examined a few hours before the occurrence of MCSs and IDC? Are the results similar or different?

5. In section 3.2, self-organizing maps (SOM)-identified large-scale meteorological patterns (LSMPs) are categorized into three frontal-system patterns and an anticyclone pattern for MCSs and two frontal-related and two anticyclone-related patterns for IDC, but without explanation about why and how these categories are defined. Taking Fig. 7h as an example, the circulation in the black box (purple arrows) shows a somewhat cyclonic pattern, but it is labeled as a type of 'Anticyclone' pattern.

6. It's not very clear why the GPLLJ 'weakens' during summer (line 144). Does this refer to a specific section of the jet? Previous studies showed that the GPLLJ peaks in June-July (e.g., Weaver and Nigam 2008). The meridional winds over the Great Plains region also appear stronger in JJA than in MAM in Fig. 2a-b.

7. Specific humidity at 925 hPa is used in the analysis in different places of the paper (e.g., Figs. 2, 6, 7). While this is the level close to the core of the GPLLJ and probably well reflects low-level moisture transport, technically, precipitation is more directly related to vertically integrated moisture convergence (and also surface evapotranspiration). I wonder if you have tried vertically integrated moisture flux or moisture convergence in the analysis and if you get similar results.

8. In Section 3.4, I'm curious if there are also a lot of IDC events during the fall as shown in Table 2. It would be nice to have results (like Fig. 11) from other seasons in the supplementary materials.

*Technical corrections:*

1. Fig. 2, it's better to mask out wind vectors and specific humidity over the mountainous region where the surface is above the 925 hPa level. In the caption, it says "precipitation" but the text indicates it's convective precipitation (lines 120-121). Can you please clarify?

2. Figs. 6-7, can you please add the frequency (%) to each LSMP pattern to the figures?

3. Fig. 12, is this for summer or all the seasons?

4. Lines 319-320, which figure do you refer to?